REMARKS

In view of the above amendments and the following remarks, reconsideration of the objections and rejections and further examination are respectfully requested.

The specification and abstract have been reviewed and revised to improve their English grammar as well as address the objection in item 4 on page 2 of the Office Action. The amendments to the specification and abstract have been incorporated into a substitute specification and abstract. Attached are two versions of the substitute specification, a marked-up version showing the revisions, as well as a clean version. No new matter has been added.

In accordance with Examiner's request, the title of the invention has been amended. The invention is now titled "COMPILER APPARATUS AND METHOD FOR OPTIMIZING A SOURCE PROGRAM."

Original claims 1-59 have been cancelled without prejudice or disclaimer of the subject matter contained therein. New claims 60-72 have been added.

Original claims 2-8, 11, 12, 14, 22-26, 28, 29, 32, 34, 39, 40, 43, 47, 49, and 54-56 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. New claims 60-73 have been drafted to comply with 35 U.S.C. § 112, second paragraph. Thus, this rejection is believed clearly inapplicable.

Original claims 1-26 and 42-59 were rejected under 35 U.S.C. § 101 for failure to recite statutory subject matter (i.e., for reciting software per se). However, new claims 60-72 have been drafted to comply with 35 U.S.C. § 101. Thus, this rejection is believed clearly inapplicable.

Claims 1-15 and 19-56 were rejected under 35 U.S.C. § 102(b) as being anticipated by Takano et al. (U.S. 5,790,874). Claims 57-59 were rejected under 35 U.S.C. § 102(b) as being anticipated by Mozdzen et al. (U.S. 5,537,656). Further, claims 16-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Takano in view of Mozdzen. These rejections are believed clearly inapplicable to new claims 60-72 for the following reasons.

New independent claim 60 recites a compiler apparatus (encoded on a computer-readable recording medium) for generating a machine language program for a processor. Further, claim 60 recites that the processor for which the compiler apparatus generates

the program includes a plurality of instruction issue units and a plurality of corresponding execution units, wherein each instruction issue unit issues instructions to a corresponding execution unit, and wherein each instruction unit includes instruction registers for storing the instructions to be executed by the corresponding execution unit.

In addition, claim 60 recites that the compiler apparatus includes an optimization unit operable to receive intermediate codes including instructions, and operable to optimize scheduling of the instruction by scheduling the instructions to reduce a hamming distance between two instructions including (i) an instruction in a target instruction cycle, and (ii) an instruction in an instruction cycle that immediately precedes the target instruction cycle, the two instructions being instructions stored in instruction registers of the same instruction unit. Finally, claim 60 recites that the optimization init is operable to schedule the instruction to reduce the hamming distance for instructions which are scheduled for each of the instruction cycles. The Takano and Mozdzen references or any combination thereof fail to disclose or suggest the above-mentioned features of claim 60.

Rather, Takano teaches reducing hamming distances between bit sequences of instructions transmitted from a memory 115 to a processor 101 by changing the scheduled sequence of the bits of the instructions on the instruction bus 111 (see col. 9, lines 40-45; and Fig. 1).

Thus, in view of the above, it is clear that Takano teaches changing the scheduled sequence of the bits of instructions, but does not disclose or suggest reducing a hamming distance between an instruction from a target instruction cycle and an instruction cycle immediately preceding the target instruction cycle, as recited in claim 60. In other words, scheduling instructions by changing a sequence of bits of instructions, as disclosed by Takano, does not disclose or suggest changing a hamming distance of instructions that are scheduled for the instruction cycles (e.g., the target cycle and the cycle immediately preceding the target cycle), as required by claim 60.

Moreover, in view of the above, it is clear that Takano does not disclose or suggest that two instructions, of which the hamming distance is reduced, are instructions stored in the same instruction unit, as recited in claim 60. On the other hand, Takano teaches rescheduling instructions on the instruction bus (i.e., not instructions stored in the

same instruction unit, as recited in claim 60). Therefore, it is respectfully submitted that Takano does not anticipate new independent claim 60.

Furthermore, Takano does not suggest the above-discussed limitations of claim 60. Therefore, it would not have been obvious to one of ordinary skill in the art to modify Takano so as to obtain the invention of new claim 60. Accordingly, it is respectfully submitted that claim 60 and claims 61-64 which depend therefrom are clearly allowable over Takano.

New independent claims 69 and 71 recite a method and a program causing a computer to execute a method, respectively, wherein the method recited in claims 69 and 71 is similar to the apparatus of independent claim 60 (i.e., claims 69 and 71 include the same optimization and scheduling as recited in independent claim 60). Thus, for reasons similar to those discussed above, it is respectfully submitted that claims 69 and 71 are allowable over Takano.

New independent claim 65 recites a compiler apparatus that operates in a similar manner as the above-mentioned compiler apparatus of claim 60, except that the optimization unit is operable to optimize the instructions by changing, for each instruction cycle, a correspondence between (i) instructions to be executed in the same instruction cycle, and (ii) the instruction issue units from which the instructions are issued for execution.

Thus, for the same reasons discussed above, it is clear that Takano teaches rescheduling bits of instructions to reduce a hamming distance, but does not disclose or suggest changing a correspondence between instructions to be executed in the same instruction cycle and the instruction units from which the instruction are issued. Therefore, it is clear that Takano does not anticipate independent claim 65.

Furthermore, Takano does not suggest the above-discussed limitations of claim 65. Therefore, it would not have been obvious to one of ordinary skill in the art to modify Takano so as to obtain the invention of new claim 65. Accordingly, it is respectfully submitted that claim 65 and claims 66-68 which depend therefrom are clearly allowable over Takano.

New independent claims 70 and 72 recite a method and a program causing a computer to execute a method, respectively, wherein the method recited in claims 70 and

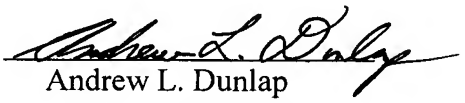
72 is similar to the apparatus of independent claim 65 (i.e., claims 70 and 72 include the same optimization as recited in independent claim 65). Thus, for reasons similar to those discussed above, it is respectfully submitted that claims 70 and 72 are allowable over Takano.

Further, the Mozdzen reference was cited for teaching the features of original independent claims 57-59 and dependent claims 16-18. However, the Mozdzen reference also fails to disclose or suggest the above-discussed features of independent claims 60, 65, and 69-72 which are lacking from Takano. Thus, for the same reasons discussed above, it is clear that the Mozdzen reference in combination with the Takano reference does not disclose or suggest the features of independent claims 60, 65, and 69-72. Therefore, no obvious combination of Takano and Mozdzen would result in, or otherwise render obvious the invention of claims 60-72.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance and an early notification thereof is earnestly requested. The Examiner is invited to contact the undersigned by telephone to resolve any remaining issues.

Respectfully submitted,

Taketo HEISHI et al.

By: 
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